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**Children's Development in Identifying the Intentions of Others:  
The Influence of Social Cues and Outcome Severity**

A Dissertation Presented

by

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Abstract of the Dissertation

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The current study examined age-related changes in how well young children could identify other children's intentions in social situations. This relation was examined for children's judgments of others' intentions in situations where one of two social cues was present and when negative outcomes were either severe or minor. Participants were 94 children between the ages of 4 and 7 years who were recruited from the community. Participants watched several short videos of two children interacting and stated whether one of the children acted on purpose or by accident. Children's correct judgments of others' intentions increased with age. A stronger association was found between age and children's correct intention judgments when negative outcomes in the situation were minor, compared to more severe outcomes. Children also made more correct judgments of intentions for verbal reaction cues compared to gaze cues and for accidental gaze cues compared to intentional gaze cues. Only the older children in the sample could interpret intentions based on accidental gaze cues with greater than chance frequency. Implications

are discussed for parents and educators who want to facilitate appropriate development of how children perceive the intentions of their peers.

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## Children's Development in Identifying the Intentions of Others:

### The Influence of Social Cues and Outcome Severity

Children's interpretation of social stimuli has been the focus of much attention in terms of its relation to individual differences in children's responses to the problems they encounter with their peers. Crick and Dodge (1994) listed children's interpretation as the second step after the encoding of social stimuli in their reformulated social information processing model. During the interpretive phase, children make attributions for the behavior of their peers, which affect several subsequent steps in their social information processing before children respond to problems in peer situations. One useful way of classifying these attributions is based on whether children believe other children's actions were intentional because this distinction influences their responses. For example, children who perceive another child's bumping into them as accidental should be more likely to ignore it than if they perceive the bump as being on purpose. In addition, if children believe a bump to be intentional, they should be more prone to display anger, or even retaliate in an aggressive manner. This effect has been observed in experiments when children who believed ambiguously intended, negative peer actions to be intentional responded just as aggressively as children who were the victims of actual intentional actions (Dodge, 1980; Steinberg & Dodge, 1983).

#### *Social Cues and Intention Judgments*

In order for children to attribute others' actions to specific intentions, they must be developmentally capable of reasoning about others' mental states. By 4 years of age, children give correct responses on theory of mind tasks testing knowledge of others' false beliefs (Wellman, Cross, & Watson, 2001), and can answer questions about others'

intentions under certain conditions. For example, Moses (1993) tested 3-year-olds' ability to correctly identify a videotaped character's intention after the character announced what he or she was about to do and then either successfully or unsuccessfully performed the action. The study found that even the youngest 3-year-olds were able to correctly identify the character's intention. Other studies have found similar competence by 3- and 4-year-olds in judging intentions when given another person's goal prior to performing a task (Shultz, Wells, & Sarda, 1980; Shultz & Wells, 1985). Children at this age can observe whether the outcome of the event matches the person's original goal and conclude that the act was intended only if the goal and outcome match. However, when 3- and 4-year-old children are not given information about others' initial goals, they are poor at correctly interpreting their intentions (Astington & Lee, 1991; Berndt & Berndt, 1975; Smith, 1978). In order to correctly judge others' intentions, children and adults often need to look for signs in the other person's behavior, or social cues, which indicate that person's intentions. Although children are capable of reasoning about intentions at age 4, they still need to develop the ability to judge intentions from social cues. However, the developmental process through which children learn social cues that signal intentions is not well understood.

How and when children improve in interpreting social cues is important to understand for two reasons. First, knowing what cues children *should* be able to correctly interpret for their age could provide useful guidance for children's social education. Past studies have linked inaccurate intention identification with aggression (Dodge & Coie, 1987; Dodge & Somberg, 1987) and social maladjustment (Dodge, Murphy, & Buchsbaum, 1984). If children are not actually being bullied or provoked by other

children, decreasing their interpretive errors through instruction about the meaning of social cues could decrease the likelihood that they will retaliate inappropriately. Second, knowledge about children's interpretive abilities at different ages could explain some of children's social difficulties. Information about whether children are worse than their peers at interpreting social cues could be used in conjunction with other assessment measures to help psychologists explain why children are having problems interacting with their peers.

The current study provides information about children's abilities to use two specific cues to determine others' intentions: children's verbal reactions to having caused negative events and the direction of their gaze prior to having caused negative events. For example, if a girl accidentally knocks over a glass and responds by saying "Oops!", this would be an example of a verbal reaction cue. Alternatively, if she were looking the other way when she knocked it over, this would be an example of a direction of gaze cue. These two types of cues are each important signs of others' intentions. Words like, "Oops!" or "Whoops!" by their very definitions indicate that the speaker's previous action was accidental. Although there is no parallel word to suggest that something was intentional, some phrases express satisfaction at having executed an intentional action (e.g. "There we go!"), and other verbalizations signal that an action was done with negative intentions (e.g. a taunting laugh). Variations in gaze direction and eye contact are widely recognized as cues of many different internal mental states in human interactions, including one's intentions (Kleinke, 1986; Phillips, Wellman, & Spelke, 2002). For example, in the simple act of grasping an object, people usually direct their head and eyes towards the object before reaching for it. Thus, a child could predict that

another child who looks at a crayon is about to grasp it, based on the direction of that child's gaze. Likewise, if a child brushes another child's crayon off a table when looking at and reaching for a different crayon, the owner of the crayon could view this act as unintentional. Although neither verbal reactions nor gaze cues by themselves provide absolute guarantees of others' intentions, they signal probable intentions that can be substantiated with additional information.

Research demonstrates that verbal reaction and gaze cues can influence the behavior of children from as early as infancy. Two studies have examined whether infants respond differentially to verbal reactions indicating that a behavior was an accident (e.g. "Whoops!") versus reactions indicating intentional behavior (e.g. "There!"). Carpenter, Akhtar, and Tomasello (1998) presented 14- through 18-month-olds with a demonstration of a simple action, sometimes followed by verbal reactions indicating that the action was intentional and other times followed by verbal reactions indicating that it was an accident. They found that the infants reproduced actions followed by intentional verbal reactions more than those followed by accidental reactions. Likewise, Tomasello and Barton (1994) found that 2-year-olds only learned novel words for actions that were associated with intentional verbal reactions and not those that were paired with accidental reactions. Other studies have found that infants' abilities to connect another person's gaze with an object they intend to acquire develop between 7 and 12 months of age (Phillips et al., 2002; Woodward, 2003).

Two studies have looked at preschool children's abilities to identify intentions based on gaze and other social cues. Astington and Lee (1991) studied whether 3-, 4-, and 5-year-olds were able to choose which of two cartoons showed a character who acted

intentionally. The cartoons differed in the direction of the characters' gaze, as well as the type of motion portrayed. The judgments of 3-year-olds were no better than chance, but both the 4- and the 5-year-olds were above chance, with the 5-year-olds outperforming both the 3- and 4-year-olds. However, because this study used cartoons with several cues indicating the intentions of the characters, 4- and 5-year-olds could have chosen the correct cartoon based on other cues besides gaze direction. The only study to systematically examine the developmental effect of gaze direction on children's identification of others' intentions was by Smith (1978). In this study, 4-, 5-, and 6-year-olds, as well as adults, viewed videos of a woman performing various actions that were intentional or unintentional. This study manipulated whether the woman was looking at what she was doing and how voluntary her motion appeared, among other factors. The results indicated that the 4-year-olds were most likely to rate any of the actions as intentional, regardless of the cues. 5-year-olds were somewhat influenced by the type of motion and the direction of the woman's gaze, and 6-year-olds' judgments were the most similar to those of adults. The findings from Astington and Lee (1991) and Smith (1978) indicate that preschool children are relatively poor at identifying others' intentions, but they improve substantially in this ability during the transition to elementary school.

Even though no studies have determined whether preschoolers can judge intentions from verbal reaction cues, a few studies point to a tendency in infants and toddlers to be more responsive to vocal cues in general, compared to facial cues. Infants adjust their behavior more in response to vocal than facial cues (Mumme, Fernald, & Herrera, 1996; Vaish & Striano, 2004), and when infants and toddlers must choose between discrepant facial and vocal cues presented simultaneously, they respond to vocal

cues disproportionately (Volkmar, Hoder, & Siegel, 1980). Other studies using paradigms where a false verbal statement is contradicted by facial cues found that children between the ages of 3 and 5 years undergo a transition from using vocal cues to using facial cues in ascertaining a person's true beliefs (Eskritt & Lee, 2003; Freire, Eskritt, & Lee, 2004). Although these studies did not examine cues that determine others' intentions, the results are consistent with the possibility that toddlers are better at using vocal cues and continue to develop in their abilities to correctly interpret facial cues, like direction of gaze.

Based on these findings, and the findings from Smith (1978) on the differences between ages in determining intentions from gaze direction, the current study expected to find that younger children would be more adept at using verbal reaction cues to determine others' intentions, compared to gaze direction cues. Likewise, the current study expected that the age-dependent increases in correct intention judgments from verbal reaction cues would be smaller than those from gaze cues, between ages 4 and 7. Because 4-year-olds are presumed to have some ability to determine others' intentions based on verbal reaction cues, there is less room for improvement between ages 4 and 7 in correctly interpreting these cues, as opposed to gaze cues, which 4-year-olds are poor at using to judge others' intentions.

#### *Intention Judgments for Accidental and Intentional Actions*

Apart from the social cues themselves, there is some evidence that younger children are predisposed towards believing that negative actions are done intentionally. Several studies have examined children's judgments of accidental and intentional behavior in videotaped interpersonal situations where one child hurts another child or damages the child's property. These studies, examining children age 4 to 11 years, have

converged on the finding that even the youngest children can correctly classify instances of intentional negative behavior (Berndt & Berndt, 1975; Dodge et al., 1984; Dodge & Coie, 1987; Dodge, Pettit, McClaskey, & Brown, 1986; Katsurada & Sugawara, 1998). In all of these studies, children's judgments were near ceiling performance, and only one other study has found superior performance by older children in identifying intentional negative behavior (Dodge & Price, 1994). However, several studies have found age-related increases in correct intention judgments when children identify unintentional negative behavior. Berndt and Berndt (1975) found that children's abilities to recognize accidental behavior increased between the ages of 4 and 8 but not between 8 and 11. Dodge et al. (1984) obtained similar results, with increases in correct intention judgments occurring between ages 5 and 7 but not between 7 and 9. Only one study has found developmental differences in correct intention judgments for accidental behavior after age 7 (Dodge et al., 1986), and two studies did not find any developmental differences (Dodge & Coie, 1987, ages 6-8; Dodge & Somberg, 1987, ages 9-11).

This observed discrepancy between accuracies for intentional and accidental behavior by younger children may be the product of a developmental process by which children learn whether negative actions are intentional. Dodge (2006) proposed that when children begin to reason about others' intentions, they assume that negative actions are synonymous with negative intentions. According to Dodge, children between the ages of 4 and 7 gradually learn that this belief is not true if negative events are accompanied by cues indicating that other children's intentions were benign. The current study sought to determine whether the prior findings suggesting a different developmental pattern for classifying intentional and accidental behavior extend to situations where only one cue

(as opposed to several) represents the child's intentions. It is unclear from most previous studies whether the cues used for the intentional action video scenes were parallel to those used for the accidental action video scenes. If this were not the case, younger children's apparent predisposition towards classifying actions as intentional could have more to do with the increased salience of the intentional cues relative to the accidental cues. If previous findings replicate, the youngest children in the current study should be able to correctly judge intentional behavior but not accidental behavior. As a result, children's correct judgments of intentions for negative events should increase to a greater extent from age 4 to 7 for accidental behavior than for intentional behavior.

#### *Outcome Severity and Intention Judgments*

Children's judgments of others' intentions can also be influenced by a number of other factors that do not in and of themselves give any information about the other person's intention. One potentially important situational factor to consider is the severity of negative outcomes for which children must judge intent, even though the severity of a negative event, such as the degree of damage done to a toy, communicates nothing about the intentions of the actor. Young children may still believe that actions affecting them negatively are likely to be purposefully committed because they confuse others' intentions with the extremity of the negative outcome. A classic study by Piaget (1948) demonstrated that young children are strongly influenced by a situation's outcome in making moral judgments. Piaget compared children's moral judgments for two hypothetical situations: one in which a child causes severe damage with positive intentions and another in which a child causes minor damage with negative intentions. Piaget observed that younger children were more likely to say that the child who caused



more damage was naughtier, and older children were more likely to say that the child who had negative intentions was naughtier, with a transition in the approach to moral judgment occurring between ages 7 and 10. Karniol (1978) reviewed subsequent research findings for studying moral judgment when intentions and outcome severity information (e.g. degree of property damage or personal injury) were varied. The review concluded that young children use both intention and outcome severity to make moral judgments but that older children use outcome severity to a lesser extent than younger children.

Although no studies have determined whether severity of a negative outcome affects children's perception of others' intentions, a study by Nelson (1980) points to a possible process through which younger children's intention judgments may be influenced. In this study, 3- and 7-year-olds were presented with stories in which an action was done with positive or negative intentions, and the action had an outcome that was either positive or negative. They were asked to make moral judgments about the story character performing the actions, and children were also asked to retell the events of the story, as a check on their recall. In conditions where the intention did not match the outcome, younger children were more likely to err in their recall by saying that the intention matched the outcome, compared to the reverse (outcome matching the intention). Young children may believe that bad outcomes are automatically indicative of bad intentions. If this is true, outcomes with higher degrees of negativity could increase the chances that children will discount cues signaling an accident and conclude that the behavior was motivated by negative intentions.

The extent to which children's correct judgments of intentions increase between ages 4 and 7 should depend on an interaction between the severity of the negative

outcome and the type of cue available. It is expected that outcome severity will have a greater impact on children with moderate abilities to interpret a cue, compared to those with weak or strong abilities. If children have little or no knowledge of a social cue as an indicator of intention, their intention judgments will be at chance levels and variations in outcome severity should not make a difference. Additionally, if children have extensive cue knowledge, their comfort with interpreting the cue should outweigh factors like outcome severity that do not provide substantive information on intentions. Because children are believed to learn the meanings of verbal cues earlier than gaze cues (e.g. Eskritt & Lee, 2003; Freire et al., 2004), the approximate ages of children who have moderate abilities to interpret cues in the current study should be older (i.e. ages 6 to 7) in situations with gaze cues and younger (i.e. ages 4 to 5) in situations with verbal reaction cues. By extension, the number of correct interpretations of gaze cues for older children and verbal reaction cues for younger children should be lower in high severity conditions, based on the influence of outcome severity seen in moral judgment studies (e.g. Piaget, 1948; Karniol, 1978; Nelson, 1980).

This distinction has different implications for the correlations between age and correct intention judgments across severity conditions for each cue type. For gaze cues, the younger children ought to be similarly inaccurate across severity conditions (i.e. chance levels), and the older children ought to be correct less of the time in high severity conditions compared to low severity conditions. Thus, the correlation between age and correct intention judgments should be stronger in low severity conditions when gaze cues are being interpreted. By contrast, for verbal reaction cues, the younger children should be correct less in high severity conditions compared to low severity conditions, but the

older children should be similarly correct (i.e. nearly perfect) across severity conditions. As a result, the correlation between age and correct intention judgments should be stronger in high severity conditions when verbal reaction cues are being interpreted.

### Aims and Hypotheses

The main goal of the current study was to examine the factors affecting age-dependent increases in children's abilities to use social cues to judge intentions. This study is the first to examine the specific effects of verbal reaction cues and direction of gaze cues on the intention judgments of preschool and elementary school children in peer interactions. The current study also sought to determine whether previous research findings that younger children can more accurately classify intentional actions than accidental actions extend to the current study where only one social cue for determining intentions is available. In addition, the current study is the first to examine whether the severity of the negative outcome moderates the relation between children's age and the correctness of their intention judgments.

Analyses were conducted in three main steps. First, two 2 X 2 X 2 mixed design repeated measures ANOVA's were conducted with cue type (gaze or reaction), intention type (intentional or accidental), and outcome severity (severe or minor) as independent variables, and number of correct intention judgments as the dependent variable. The first analysis was conducted with age as a covariate (functioning as an additional independent variable). The goal of this analysis was to test the study's hypotheses involving the three factors thought to influence the relation between children's age and how many correct intention judgments they make. The second analysis did not include age in the model and examined non-developmental main effects of, and interactions between, cue type,

intention type, and outcome severity. Second, the sample was split into two halves based on age, and younger and older children's correct intention judgments were compared to chance values. This analysis was designed to give an approximation as to which intentions younger and older children in this sample could interpret at minimum. Third, an exploratory analysis was conducted comparing younger and older children's intention judgments to those of adults. This analysis was intended to give a preliminary indication of whether the ability to judge any types of intentions continues to develop past the age of seven.

### *Hypotheses*

1. Children's correct intention judgments increase with age between ages 4 and 7.
2. Children's correct intention judgments increase with age to a greater extent for gaze cues compared to verbal reaction cues.
3. Children's correct intention judgments increase with age to a greater extent for situations with accidental behavior compared to those with intentional behavior.
4. Children's correct intention judgments increase with age to a greater extent for: (a) gaze cues in low outcome severity situations relative to high outcome severity situations, and (b) verbal reaction cues in high outcome severity situations relative to low outcome severity situations.

## Method

### *Participants*

The current study was conducted at Stony Brook University. 96 4- to 7-year-old children living in Suffolk County, New York, were recruited by distributing letters to local preschools, day care centers, and elementary schools, and by mailing letters to families with children in this age range. In all cases, a letter was distributed to families with 4- to 7-year-old children that described the study and provided parents with the experimenter's contact information. Interested parents called the experimenter for more information and to arrange an appointment if they wanted their child to participate. In exchange for participation, children were entered into a lottery where they could win monetary prizes. One child was dropped from the study because his English skills were too weak to allow him to understand the experimenter. Another child refused to answer any of the experimenter's questions and thus did not participate. The final sample consisted of 94 children (51 boys and 43 girls) between the ages of 4 years, 1 month and 7 years, 11 months. 84 were Caucasian, 6 were Latino/Hispanic, 2 were Asian, and 2 parents did not report their children's ethnicities. Means and standard deviations for the demographic variables are displayed in Table 1. Procedures undertaken for recruitment and obtaining parental permission were in accordance with Stony Brook University's IRB policies.

### *Stimuli*

Children watched a set of 16 short videotaped interactions between two children who were actors. Each of the interactions in the videos (5 to 10 seconds in length) involved a scripted activity in which two children were engaged in a task, and one of the

children, either accidentally or on purpose, damages something that belongs to the other child or throws something that hits the other child. Half of the participants viewed interactions where a relatively severe negative event occurs, and half of the participants viewed interactions where a relatively minor negative event occurs. Across severity conditions, the same footage of the children's interactions was used, with the exception of a single shot showing the negative event. As a result, children viewed the same social cues, regardless of the severity condition. Two within-subjects' factors were manipulated: type of social cue and type of intention. Vignettes showed either gaze or verbal reaction cues accompanying the negative event, and these cues either indicated that the event occurred by accident or on purpose.

The interactions between the children in the videos take place in four different situations. These situations all involve one child causing the following negative consequences for the other child: spilling a cup of juice on the other child's drawing, stepping on the other child's toy airplane, knocking over the other child's block tower, or throwing a crumpled up ball of paper and hitting the other child. In each video, the perpetrator is wearing an orange shirt and the victim is wearing a grey shirt, in order to make it clear to participants which child's actions were supposed to be judged. Male participants viewed one version of the vignettes that had two pairs of male actors, and female participants viewed another version of the vignettes that had two pairs of female actors. Apart from the gender difference, the interactions were the same for each video set. All of the actors in the videos were between 8 and 10 years old. Actors of this age were sought, despite the fact that they were older than the participants, because the older children could more realistically dramatize the necessary actions than children in the

participants' age range. The age of the actors was also thought to be close enough to the participants' ages that children would not question the actors' participation in the selected activities or have different preexisting assumptions about the intentions with which they would act compared to children their own age. Although the same child actors appeared in more than one vignette (two situations per child pair), they played the perpetrator and victim an equal number of times, balanced across the conditions.

The vignettes showing the gaze cues begin by showing the two children engaged in a task. The accidental vignettes have the offending child looking in the opposite direction of the other child before the negative event occurs. By contrast, the intentional vignettes show the child looking directly at the other child (or his or her property) before the negative event occurs. The type of motion with which the child causes the negative outcome is the same across conditions. As the child begins to enact the negative event, the video cuts to a close up of the event occurring next to the victim, whose expression is not visible. The final shot briefly shows the offending child looking at the result of his or her action (shot from behind the child so that we cannot see his or her expression), in order to make it clear that the offending child was the one who caused the negative event. The shots of the negative events occurring and the final shots were identical across the accidental and intentional gaze conditions.

The vignettes showing verbal reaction cues begin the same way, showing the two children involved in the same tasks shown in the gaze cue vignettes. However, right before the negative event occurs, the camera shifts so that the viewer cannot see which direction the perpetrator is looking. The shot of the negative event and the final shot are identical across the intentional and accidental verbal reaction cue conditions and to the

gaze cue conditions as well. However, during the final shot from behind the offending child, this child verbally responds to the damage. For the accidental reactions, the child says “Oops!” in a surprised manner, and for the intentional reactions, the child says “Ha, ha!” in a taunting voice. The same accidental and intentional vocalizations were used for each of the vignettes: the most convincing “Oops!” and “Ha, ha!” were selected from among several that the child actors attempted and were then dubbed into each reaction cue vignette.

80 college students were recruited to view the videos to ensure that the correct intentions were perceptible to adults and that the outcome severity manipulation was successful. The college students were enrolled in Psychology courses at Stony Brook University and participated in exchange for course credit. Half of the college students judged the intentions of the same vignettes viewed by the child participants, and the other half rated the severity of the negative actions. The first group of 40 students who judged the intentions viewed both the male and female versions of the vignettes (32 total). Students chose the correct response 79% of the time for both the male and female versions of the vignettes. Because the proportion of correct responses was somewhat lower than expected, one-sample *t* tests were conducted to ensure that none of the intention-cue combinations (i.e. accidental gaze, accidental verbal reaction, intentional gaze, or intentional verbal reaction) were answered at chance levels. The results for the male videos revealed that participants’ responses were significantly above chance (a score of 2) for accidental gaze cues,  $t(39) = 8.53$ ,  $p < .001$ , accidental verbal reaction cues,  $t(39) = 5.70$ ,  $p < .001$ , intentional gaze cues,  $t(39) = 10.18$ ,  $p < .001$ , and intentional verbal reaction cues,  $t(39) = 7.28$ ,  $p < .001$ . The results for the female videos also found



that participants' responses were significantly above chance for accidental gaze cues,  $t(39) = 10.14, p < .001$ , accidental verbal reaction cues,  $t(39) = 4.97, p < .001$ , intentional gaze cues,  $t(39) = 10.51, p < .001$ , and intentional verbal reaction cues,  $t(39) = 4.85, p < .001$ .

The 40 students in the second group were randomly assigned to either view the severe or the minor versions of each of the four situations. For this task, the videos were edited so that only the close up shot of the damage occurring was shown, in order to prevent the intentional or accidental cues from biasing the ratings of severity. Each participant watched the severe or minor versions of the 4 negative events, shown in a randomized order. The experimenter prefaced each video clip with a brief description of what happened in the interaction between the children, as a means of placing the event in the context of the situation. On Likert scales of 1 to 7, participants were asked to rate the severity of each event, the severity of the damage to the objects in each video, how easy it would be to fix the damage, and how upset children between the ages of 4 and 7 would be if the event happened to them. One question also asked participants to rate how intentional they believed each action to be, in order to ensure that neither version of the event appeared to be more intentionally executed than the other.

No significant differences in ratings of overall severity were found between those in the high severity group compared to the low severity group,  $t(38) = .49, ns$ . However, the high severity group rated the damage to the objects in the videos as more severe,  $t(38) = 2.81, p < .01$ , and less easily fixed,  $t(27.88) = -2.74, p < .05$ , compared to the low severity group. These questions were only asked about 3 of the 4 situations because the situation where one child throws a paper ball at the other child does not have an object

getting damaged. No significant differences between the high and low severity groups were found for how intentional the action was,  $t(38) = .75, p = .46$ , or how upset a child would be in the same situations  $t(38) = -.29, p = .78$ . Because no evidence was found to support the difference between the high and low severity conditions in the paper ball vignettes, this situation was dropped (4 vignettes), and children's scores for the remaining three situations were analyzed. Thus, children could receive scores of 0 through 12 on total correct intention judgments and 0 through 3 on correct intention judgments for each of the 4 intention-cue combinations.

### *Materials*

The videos were presented on a laptop with a 15.6 inch screen on a table in a small room, and children were seated in a chair directly in front of the laptop. The screen was at eye level and children sat at an appropriate viewing distance. The volume was set at the same level for all children, such that the verbal reaction cues could be heard clearly but were not loud enough for their occurrence to be startling.

### *Parent Questionnaire*

Parents filled out a brief demographic questionnaire about their children. This questionnaire included information on siblings and perceived behavioral difficulty of their child (both factors that could potentially be related to children's judgment of social cues). Parents wrote down the number of siblings and their ages and rated how difficult their child was to handle on a Likert scale from 1 (not difficult) to 7 (very difficult). The sibling information was used to form two variables: whether children had siblings close in age (within two years) and whether children had older siblings. Because the behavioral

difficulty item was positively skewed, a square root transformation was performed before it was used in analyses.

### *Procedure*

Families of 81 child participants responded to the recruitment letters and made an appointment over the phone to come to the lab at Stony Brook University to participate in the study. Families of 13 child participants gave permission for their children to participate in the study while they were at school. These participants were from two schools (one preschool and one daycare) and were tested in a vacant room next to their classroom. Parents of these children received the permission form and demographic form with the recruitment letter and returned these forms to their children's teacher if they wanted them to participate. Parents of children who participated at the lab filled out the permission form and demographic questionnaires after they arrived. Otherwise, the same procedures were followed for children tested in each location.

Participants were seated in front of the laptop where they would view the videos. The experimenter gave them a brief description of the task (see Appendix) and asked them to explain the phrases "on purpose" and "by accident" (if they could not adequately explain these terms, the experimenter provided them with definitions). The order of the video vignettes was varied using a Latin square procedure. Each set of 4 vignettes that participants viewed was composed of the 4 unique intention-cue combinations (i.e. accidental gaze, accidental verbal reaction, intentional gaze, intentional verbal reaction) shown in a different situation each time. The intention-cue combinations were also shown in a different order in each of the sets. Participants were randomly assigned to watch one of four different orders of the four sets of vignettes, in addition to being randomly

assigned to see high severity negative outcomes or low severity negative outcomes. Finally, participants were randomly assigned to the order in which they would be asked the response options. Some children were asked whether the child in the orange shirt performed the action “by accident or on purpose” and others were asked whether the action was performed “on purpose or by accident.” Participants answered this question for each of the 16 vignettes, and their responses were scored as correct or incorrect. The task took approximately 5 minutes for each participant to complete.

## Results

Cell means and standard deviations for each of the variables are displayed in Table 2. Two 2 (cue type) X 2 (intention type) X 2 (outcome severity) mixed design repeated measures ANOVA’s were performed, one with age as an independent variable and the other without age. Initially, each analysis was performed three separate times, each time with a different between-subjects demographic variable: gender, presence of older siblings (children with and without older siblings), and presence of similar-aged siblings (children with and without siblings within two years of age). None of these variables had significant effects on children’s correct intention judgments or significant interactions with any of the other variables, regardless of whether age was included in the analysis. As a result, they were removed prior to conducting the main analyses. Additionally, the analysis was conducted with parents’ ratings of children’s behavioral difficulty as an independent variable. Because parents’ ratings of behavioral difficulty were correlated with age, such that younger children were rated as more difficult, the effects of age were controlled for this analysis. Behavioral difficulty was not significantly

related to any other effects in the model and was also removed before running the main analyses.

### *Main Analyses*

Age served as an independent variable in the first analysis: only the effects involving age were examined for this analysis and not effects with adjusted means. The first hypothesis was supported: children's age was related to how many correct intention judgments they made (Table 3). Hypotheses 2, 3, and 4 were not supported: the age by cue type, age by intention type, and age by cue type by outcome severity interactions were not significant. However, the age by outcome severity interaction was significant. Follow-up simple regressions indicated that the relation between age and correct intention judgments was larger for low severity negative outcomes ( $b = .67, p < .001$ ) compared to high severity negative outcomes ( $b = .33, p < .05$ ).

The second ANOVA without age as a covariate examined the main effects and interactions involving cue type, intention type, and outcome severity. A significant cue type by intention type interaction was found (Table 3). Children made more correct judgments of accidental behaviors compared to intentional behaviors when viewing gaze cues,  $t(93) = 3.53, p < .001$ , but this difference was not found for verbal reaction cues,  $t(93) = 1.08, ns$ . Children also made more correct judgments of verbal reaction cues compared to gaze cues for both accidental and intentional behaviors.

### *Comparisons to Chance*

Because children had a fifty percent chance of getting each item correct, younger and older children's scores were compared to chance values in order to assess the capacity of each age group to correctly judge the intentions displayed. The sample was

separated using a median split on children's age, and children's correct judgments for situations involving each of the four intention-cue combinations were compared to chance values (Table 4). Younger children's correct judgments for both of the verbal reaction conditions were significantly above chance, but their correct judgments for both gaze conditions did not differ from chance. Children who were 6 years of age or older made more correct judgments than would be expected by chance for each condition except the intentional gaze vignettes.

### *Comparisons to Adults*

In a set of exploratory analyses, children's accuracies in identifying intentions were compared to the accuracies of the 40 college students who had provided ratings on the video stimuli to support their validity. Because the college students provided ratings for both the male and female versions of the vignettes, the version that each participant rated first was used in these analyses<sup>1</sup> in order to maximize the similarity in testing conditions to those of the child participants. A 2 (cue type) X 2 (intention type) X 3 (age group) X 2 (outcome severity) mixed design repeated measures ANOVA was conducted first. As in the analysis with children only, a significant cue type by intention type interaction was found  $F(1, 131) = 14.47, p < .001$ , along with significant effects of both cue type  $F(1, 131) = 16.34, p < .001$ , and intention type  $F(1, 131) = 6.53, p < .05$ . An age group by cue type interaction was also found to be significant. In order to interpret each of the interactions, four simple ANOVA's were conducted with age as the independent variable, and the four combinations of correct intention-cue judgments as the dependent

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<sup>1</sup> Because this sample had some male and female adults rating children of the opposite gender (unlike the children who rated gender consistent targets), male and female participants were compared on their accuracies for the boy and girl versions of the vignettes. No gender differences on correct intention judgments were found for either the boy or girl versions of the vignettes.

variables for each analysis. Linear and quadratic trend analyses were conducted, as well as Games-Howell post-hoc tests comparing each of the age groups directly. Each of the omnibus ANOVAs was significant (Table 4), and significant linear trends were found for all variables except accidental verbal reaction judgments. A quadratic trend was found to be significant for accidental verbal reaction judgments,  $F(1, 131) = 8.28, p < .01$ . The post-hoc comparisons revealed that older children had more correct intention judgments than younger children for all intention-cue combinations, except intentional gaze vignettes. Adults' intention judgments were correct more than younger children's on gaze vignettes regardless of intention and compared to older children's on intentional gaze vignettes only. There were no differences between children and adults on verbal reaction judgments, with the exception of accidental verbal reaction vignettes, for which older children made more correct judgments than adults.

### Discussion

The goal of the current study was to learn how age differences in correctly judging intentions between ages 4 and 7 were affected by the type of social cue available and the severity of the negative outcome in the situation. As hypothesized, an association was found between age and correct intention judgments. This effect was stronger for low severity negative outcomes compared to high severity negative outcomes. Although this effect was predicted for gaze cues, the opposite effect was originally predicted for verbal reaction cues (a stronger age effect on correct intention judgments for high severity situations relative to low severity situations). Even though children were better at judging verbal reaction cues compared to gaze cues, their absolute proficiency at interpreting verbal reaction cues was lower than expected. As a result, the influence of outcome

severity on children's judgments of verbal reaction cues was similar to its influence on children's judgments of gaze cues.

At first glance, it might be supposed that the reduced ability of age to predict intention judgments in high severity situations might result from children's being distracted by the high severity outcomes and not performing as well as they should for their age. However, if this were true, children should have made more incorrect judgments in high severity situations, which was not the case. Instead, individual difference factors may be better predictors of children's intention judgments than age when the severity of the negative outcome is greater. Severe negative outcomes in peer interactions are more likely to lead to arguments with peers, and consequently, more intervention by caregivers. Yet, caregivers may respond to these situations in very different ways. Some adults may use these situations as opportunities to teach children about the intentions behind negative peer actions, including the social cues that signal these intentions. However, other adults may focus solely on the consequences of the actions or fail to intervene at all. By contrast, few caregivers would be likely to intervene for minor events. As a result, children's interpretation of high outcome severity situations might be more dependent on the particular responses they have received from caregivers in the past, whereas the correct interpretation of intentions in minor situations may be more dependent on age-related factors.

Because this study's design had child participants either view several severe negative events or several minor negative events, future studies will be necessary to determine whether this finding replicates in situations where child participants are not forced to interpret several negative events back to back or when participants view both



severe and minor outcomes. If children saw both severe and minor negative outcomes together, they would be able to compare similar situations of varying levels of severity, which might change the pattern of results.

Although the hypothesized interactions between age, cue type, and intention type were not found, several other interesting findings emerged. The comparisons of younger and older children's scores to chance values demonstrated which intention-cue combinations children had minimum capacities to interpret. The younger half of the sample could identify intentions from verbal reaction cues at greater than chance frequencies but not from gaze cues. The older half of the sample could identify intentions from verbal reaction cues and accidental gaze cues at greater than chance frequencies but not from intentional gaze cues. Additionally, children made more correct judgments of verbal reaction cues compared to gaze cues for both accidental and intentional behaviors (although the effect was larger for intentional behaviors). Children's superior performance in judging verbal reaction cues is consistent with the evidence that infants and toddlers are more responsive to verbal cues relative to facial cues (e.g. Volkmar et al., 1980), even though increases in correct intention judgments from age 4 through age 7 were not less for verbal reaction cues than gaze cues, as hypothesized. However, it is possible that the higher frequency of correct judgments from verbal reaction cues could have to do with the timing of the cue, rather than the nature of the cue itself. Because verbal reactions by necessity come after the negative event, just as gaze cues must come before the negative event, the type of cue and timing of the cue are naturally confounded. As a result, children could have been more correct at judging verbal reaction cues because they occur after gaze cues and are thus more easily recalled.

Children's superiority in interpreting accidental gaze cues compared to intentional gaze cues and the lack of a difference in correctly judging intentional and accidental verbal reaction cues appear to contradict previous research that found younger children to be correct more frequently in judging intentional actions (Berndt & Berndt, 1975; Dodge et al., 1986; Dodge & Coie, 1987; Smith, 1978). These findings also appear inconsistent with Dodge's (2006) suggestion that younger children generally assume negative outcomes to be caused by negative intentions. There are three possible explanations for this apparent discrepancy with previous research and theory. First, the current study's sample may differ from the samples in the previous studies, all of which were conducted over twenty years ago and in different regions of the country. Parents and teachers of participants in this sample might focus on teaching children to consider if something is an accident to a greater extent, compared to parents and teachers decades ago or parents of different cultures and socio-economic statuses than the current sample (predominantly White and upper-middle class). A second possibility has to do with the video stimuli used in the current study. No previous study has attempted to isolate single cues when asking about the intentions of children in peer situations. Young children may be more accurate at identifying intentional actions when there are several intentional cues compared to accidental actions with several cues if some of the intentional cues shown are more salient. For example, children may notice another child's angry facial expression that precedes an action more than the fact that another child is not looking where they are going.

A third reason for the current findings being discrepant with previous research may have to do with the situations chosen for the current study. The kinds of situations in

this study may be more likely to occur by accident in general. For example, children may rarely knock cups of juice on other children's drawings on purpose: this behavior probably occurs by accident more often than not. Thus, even though the child participants were likely to say that the children in the videos who laughed acted intentionally, they may have assumed that many of the videos without this mocking verbal response were accidental because these types of outcomes are typically caused by accident. This decision strategy would explain why children correctly judged accidental gaze cues more than intentional gaze cues. However, even if this is the case, the current study's findings still imply that the youngest children in this sample were not assuming that negative actions were committed intentionally. Future research will need to determine whether the theorized strategy of matching negative intentions to negative outcomes is observed in children younger than 4 years old who can answer questions about others' intentions, or whether Dodge's (2006) hypothesis should be revised.

Children's skills in judging intentions were compared to those of adults as an exploratory means of assessing what types of judgments might still improve after the age of 7. Adults made more correct judgments on situations with intentional gaze cues than did younger and older children, suggesting that in situations similar to those in this study, children improve after age 7 in recognizing intentional actions from gaze cues. Additionally, a quadratic trend was found when comparing younger children, older children, and adults in judging intentions from verbal reaction cues. Older children made more correct judgments than younger children as expected, but adults were not any more correct in their judgments than younger or older children (and were correct less often than older children in judging accidental verbal reaction cues). The reason for this relatively

poor performance on the part of adults is readily gleaned from feedback elicited from adults after the experiment as to why they chose the answers they did: many adults simply did not believe that the vocal responses of the children were genuine. Some participants believed that the children who said “Oops!” were responding sarcastically after having intentionally performed the action, and others believed the children who said “Ha, ha!” had accidentally caused the negative event, but were merely laughing benignly at the result.

Interestingly, many of the participants who were asked to explain their answers admitted to being uncertain about their responses to the verbal reaction vignettes because they could not see where the child in the video was looking before the action. In other words, these participants saw gaze direction as a surer sign of the child’s true intentions than what the child said. For this reason, adults may not have been an appropriate group to validate the reaction-cue vignettes. The superior performance by 6- and 7-year-olds on these vignettes compared to the 4- and 5-year-olds verifies that children’s correct intention judgments of situations with verbal reaction cues do increase with age. However, at some point later in development, individuals may become more reluctant to take verbal reaction cues at their face value, at least for the particular verbal reactions in the situations studied here. Alternatively, the lack of difference in correct intention judgments from verbal reaction cues between children and adults could have to do with demand characteristics of the experiment. 6- and 7-year-olds might think it is perfectly reasonable to demonstrate to an experimenter that they know what “Oops!” and “Ha, ha!” mean, allowing them to outperform younger children who have poorer knowledge of the meanings of these verbal reaction cues. However, college students, who are quite used to

participating in deceptive Psychology experiments, might want to avoid appearing naïve by giving responses that seem too obvious, making their responses indistinguishable from those of the younger children.

The current study has several strengths. The current study is the first to systematically manipulate the presence of a single social cue in peer situations, enabling conclusions to be drawn about children's relative abilities at each age to interpret specific cues in social situations. Knowing which specific cues children of different ages can use to identify intentions will inform future studies that test children's interpretations of intentions from systematic cue combinations. The current study's inclusion of an adult sample as a comparison group allows for predictions to be made about changes in children's judgments of others' intentions after age 7.

The current study also has several limitations. Because of its cross-sectional design, the developmental differences in correct intention judgments that were found cannot be assumed to parallel individual children's improvements in judging intentions between ages 4 and 7. Longitudinal research is necessary to draw conclusions about how the average child improves from age 4 to 7 in identifying intentions from different social cues. Secondly, even though the video scenes were intended to simulate actual experiences, this task might overestimate children's abilities in real situations to interpret social cues. Unlike many real situations, children had their full attention focused on each video scene and minimal competing stimuli to draw their attention away from the cues that were manipulated. Additionally, if children were actually in the situations presented in the videos, they would presumably be experiencing negative emotions that could hamper their abilities to correctly interpret the accompanying cues. Thirdly, the outcome

severity moderation finding and the results comparing children to adults were not hypothesized and should thus be viewed with caution until they can be replicated in future studies. Lastly, the current sample was primarily White and from an upper-middle class suburban area. As a result, children from different cultures or socioeconomic statuses than the participants in this study may be more or less accurate at the same ages in judging intentions, particularly if the culture in which they were raised places a different emphasis on teaching them about others' intentions.

Future studies should investigate whether there are developmental differences in children's use of other cues besides verbal reactions and direction of gaze. For example, previous research has examined children's development in recognizing emotions from facial features (e.g. Durand, Gallay, Seigneuric, Robichon, & Baudoin, 2007; Mondloch, Geldart, Maurer, & Le Grand, 2003). Discovering when children can use facial expressions of specific emotions to help determine the intentions of others is an important area in need of further study. In one previous study, 5- to 7-year-old children could recognize accidental behavior from another child's reacting with a sad expression and intentional behavior from a happy expression (Rybash, Roodin, & Hallion, 1979), but no developmental hypotheses were tested. Ultimately, the integration of research on children's performance in interpreting different social cues at different ages when judging intentions and other mental states (e.g. desires and beliefs) will provide a more comprehensive account of children's social interpretive skills throughout their development. Such knowledge could inform research on child aggression, developmental disabilities, and social anxiety in children.

Greater knowledge about children's abilities to identify intentions as they develop could also be of potential use to parents and educators who are concerned about their children's peer relationships. If aggressive children were to score poorly on measures of intention judgment relative to their peers, parents and educators might focus on changing children's attributions for negative events, when appropriate. However, if aggressive children were to score in the normal range on measures of intention judgment, parents and educators might be more successful focusing on altering children's response tendencies, as opposed to their interpretations. Knowing which cues children of different ages should be able to correctly interpret would be helpful in designing interventions that include training to improve children's judgments of others' intentions. The emergence of evidence on the effects of specific cues and other relatively fine-grained factors on children's interpretations of social situations provides valuable information about subtle influences that may escape the notice of parents, teachers, and therapists when trying to explain children's problematic behavior with their peers.

Table 1

*Participant demographics*

| Variable             | Full sample<br>Mean (SD)<br><i>N</i> = 94 | High Severity<br>Mean (SD)<br><i>N</i> = 47 | Low Severity<br>Mean (SD)<br><i>N</i> = 47 |
|----------------------|---|---|--|
| Age                  | 5.91 (1.13)                               | 5.89 (1.13)                                 | 5.93 (1.15)                                |
| Number aged 4-5      | 28  | 15  | 13   |
| Number aged 5-6      | 19  | 9   | 10   |
| Number aged 6-7      | 30  | 15  | 15   |
| Number aged 7-8      | 17  | 8   | 9  |
| Number of females    | 43  | 21  | 22   |
| Number of Caucasians | 84  | 44  | 40   |



Table 2

*Mean scores on correct intention judgments*

|                                      | Intentional<br>Mean (SD) | Accidental<br>Mean (SD) | Total<br>Mean (SD) |
|--------------------------------------|--------------------------|-------------------------|--------------------|
| <b>High Severity (<i>N</i> = 47)</b> |                          |                         |                    |
| Gaze                                 | 1.43 (.99)               | 2.04 (1.04)             | 3.47 (1.28)        |
| Verbal Reaction                      | 2.28 (1.02)              | 2.36 (.79)              | 4.64 (1.37)        |
| Total                                | 3.70 (1.59)              | 4.40 (1.31)             | 8.11 (1.90)        |
| <b>Low Severity (<i>N</i> = 47)</b>  |                          |                         |                    |
| Gaze                                 | 1.36 (1.13)              | 1.96 (1.00)             | 3.32 (1.20)        |
| Verbal Reaction                      | 2.06 (1.11)              | 2.26 (.97)              | 4.32 (1.63)        |
| Total                                | 3.43 (1.54)              | 4.21 (1.77)             | 7.64 (1.97)        |

Table 3

*Effects of age, cue type, intention type, and outcome severity on children's correct intention judgments*

| Effect                                 | <i>F</i> | $\eta^2$ |
|--|----------|----------|
| Age <sub>a</sub>                       | 31.52*** | .26      |
| Cue type <sub>b</sub>                  | 28.55*** | .24      |
| Intention type <sub>b</sub>            | 8.69**   | .09      |
| Outcome severity <sub>b</sub>          | 1.37     | .02      |
| Age X Cue type <sub>a</sub>            | .78      | .01      |
| Age X Intention type <sub>a</sub>      | .05      | .001     |
| Age X Outcome severity <sub>a</sub>    | 3.99*    | .04      |
| Cue type X Intention type <sub>b</sub> | 7.55**   | .08      |

*Note.*  $N = 94$ ,  $df_1 = 1$ ,  $df_2 = 90$ . Effect sizes are partial  $\eta^2$ .

<sup>a</sup> ANCOVA with age as a covariate.

<sup>b</sup> ANOVA without age.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

Table 4

*Mean scores on correct intention judgments by age*

| Variable             | Children < 6<br>Mean (SD)<br>N = 47 | <i>t</i> | Children > 6<br>Mean (SD)<br>N = 47 | <i>t</i> | Adults<br>Mean (SD)<br>N = 40 | <i>t</i> | <i>F</i> |
|----------------------|-------------------------------------|----------|-------------------------------------|----------|-------------------------------|----------|----------|
| Accidental gaze      | 1.70 (1.08)                         | 1.28     | 2.30 (.86)                          | 6.38***  | 2.55 (.68)                    | 9.80***  | 9.81***  |
| Intentional gaze     | 1.32 (1.16)                         | -1.07    | 1.47 (.95)                          | -.23     | 2.23 (.73)                    | 6.25***  | 13.47*** |
| Accidental reaction  | 2.09 (1.08)                         | 3.94***  | 2.53 (.65)                          | 10.81*** | 2.10 (.81)                    | 4.68***  | 5.15**   |
| Intentional reaction | 1.91 (1.12)                         | 2.54*    | 2.43 (.95)                          | 6.68***  | 2.40 (.81)                    | 7.03***  | 3.46*    |

*Note.* All *t* values are for one-sample *t*-tests. The chance value to which the mean scores were compared was 1.5. All *F* values are Welch *F*'s.

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001

## References

- Astington, J. W., & Lee, E. (1991, April). *What do children know about intentional causation?*  
Paper presented at the Biennial Meeting of the Society for Research in Child Development, Seattle, Washington.
- Berndt, T. J., & Berndt, E. G. (1975). Children's use of motives and intentionality in person perception and moral judgment. *Child Development, 46*, 904-912.
- Carpenter, M., Akhtar, N., & Tomasello, M. (1998). Fourteen- through 18-month-old infants differentially imitate intentional and accidental actions. *Infant Behavior & Development, 21*, 315-330.
- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin, 115*, 74-101.
- Dodge, K. A. (1980). Social cognition and children's aggressive behavior. *Child Development, 51*, 162-170.
- Dodge, K. A., & Coie, J. D. (1987). Social-information-processing factors in reactive and proactive aggression in children's peer groups. *Journal of Personality and Social Psychology, 53*, 1146-1158.
- Dodge, K. A., Murphy, R. R., & Buchsbaum, K. (1984). The assessment of intention-cue detection skills in children: Implications for developmental psychopathology. *Child Development, 55*, 163-173.

- Dodge, K. A., Pettit, G. S., McClaskey, C. L., & Brown, M. M. (1986). Social competence in children. *Monographs of the Society for Research in Child Development*, 51 (Serial No. 213).
- Dodge, K. A., & Price, J. M. (1994). On the relation between social information processing and socially competent behavior in early school-aged children. *Child Development*, 65, 1385-1897.
- Dodge, K. A., & Somberg, D. R. (1987). Hostile attributional biases among aggressive boys are exacerbated under conditions of threats to the self. *Child Development*, 58, 213-224.
- Durand, K., Gallay, M., Seigneuric, A., Robichon, F., & Baudoin, J.-Y. (2007). The development of facial emotion recognition: The role of configural information. *Journal of Experimental Child Psychology*, 97, 14-27.
- Eskritt, M., & Lee, K. (2003). Do actions speak louder than words? Preschool children's use of the verbal-nonverbal consistency principle during inconsistent communications. *Journal of Nonverbal Behavior*, 27, 25-41.
- Freire, A., Eskritt, M., & Lee, K. (2004). Are eyes windows to a deceiver's soul? Children's use of another's eye gaze cues in a deceptive situation. *Developmental Psychology*, 40, 1093-1104.
- Katsurada, E., & Sugawara, A. I. (1998). The relationship between hostile attributional bias and aggressive behavior in preschoolers. *Early Childhood Research Quarterly*, 13, 623-636.
- Karniol, R. (1978). Children's use of intention cues in evaluating behavior. *Psychological Bulletin*, 85, 76-85.

- Kleinke, C. L. (1986). Gaze and eye contact: A research review. *Psychological Bulletin*, *100*, 78-100.
- Mondloch, C. J., Geldart, S., Maurer, D., & Le Grand, R. (2003). Developmental changes in face processing skills. *Journal of Experimental Child Psychology*, *86*, 67-84.
- Moses, L. J. (1993). Young children's understanding of belief constraints on intention. *Cognitive Development*, *8*, 1-25.
- Mumme, D. L., Fernald, A., & Herrera, C. (1996). Infants' responses to facial and vocal emotional signals in a social referencing paradigm. *Child Development*, *67*, 3219-3237.
- Nelson, S. A. (1980). Factors influencing young children's use of motives and outcomes as moral criteria. *Child Development*, *51*, 823-829.
- Phillips, A. T., Wellman, H. M., & Spelke, E. S. (2002). Infants' ability to connect gaze and emotional expression to intentional action. *Cognition*, *85*, 53-78.
- Piaget, J. (1948). *The moral judgment of the child*. New York: Free Press.
- Rybash, J. M., Roodin, P. A., & Hallion, K. (1979). The role of affect in children's attribution of intentionality and dispensation of punishment. *Child Development*, *50*, 1227-1230.
- Shultz, T. R., & Wells, D. (1985). Judging the intentionality of action-outcomes. *Developmental Psychology*, *21*, 83-89.
- Shultz, T. R., Wells, D., & Sarda, M. (1980). Development of the ability to distinguish intended actions from mistakes, reflexes, and passive movements. *British Journal of Social & Clinical Psychology*, *19*, 301-310.
- Smith, M. C. (1978). Cognizing the behavior stream: The recognition of intentional action. *Child Development*, *49*, 736-743.

- Steinberg, M. D. & Dodge, K. A. (1983). Attributional bias in aggressive adolescent boys and girls. *Journal of Social and Clinical Psychology, 1*, 312-321.
- Tomasello, M., & Barton, M. (1994). Learning words in nonostensive contexts. *Developmental Psychology, 30*, 639-650.
- Vaish, A., & Striano, Y. (2004). Is visual reference necessary? Contributions of facial versus vocal cues in 12-month-olds' social referencing behavior. *Developmental Science, 7*, 261-269.
- Volkmar, F. R., Hoder, L., & Siegel, A. E. (1980). Discrepant social communications. *Developmental Psychology, 16*, 495-505.
- Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory-of-mind development: The truth about false belief. *Child Development, 72*, 655-684.
- Woodward, A. L. (2003). Infants' developing understanding of the link between looker and object. *Developmental Science, 6*, 297-311.

## Appendix

### Experimenter Script for the Video Task

“Today you will be watching some short videos of two children playing. Your job is to decide if one of the children does something on purpose or by accident.

Can you tell me what it means when someone does something by accident?”

[If they don't get this correct, then:]

“An accident is when you don't mean to do something. Like if you break something and you didn't mean to break it, that would be an accident.

Can you tell me what it means when someone does something on purpose?”

[If they don't get this correct, then:]

“On purpose is when you mean to do something. Like if you break something and you meant to break it, that would be on purpose.

Now, we are going to watch the videos. After each video, I will stop the tape and ask you whether the child in the orange shirt did something on purpose or by accident. You need to wait until each video is finished before you say what the answer is. Do you have any questions?”

Questions about the videos:

“Did the boy (girl) knock over the blocks on purpose, or by accident?”

“Did the boy (girl) throw the paper ball at the other boy (girl) on purpose, or by accident?”

“Did the boy (girl) knock over the cup on purpose, or by accident?”

“Did the boy (girl) step on the airplane on purpose, or by accident?”

[After the first four videos, say:]

“Was that on purpose or by accident?”